BRIEF REPORTS

Neonatal Assessment Beyond Birth Weight

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The measurement of birth weight (BW) is a traditional, reliable and sensitive indicator for predicting the immediate or late outcome of a newborn. In developing countries, recording of BW is associated with many logistic problems. Measuring fetal growth by a simple, low priced, reliable and acceptable method, applicable by paramedical workers, has become an urgent need for Third World countries(1). Few earlier studies(1-3) have tried to evaluate the usefulness of surrogators of BW like mid arm circumference (MAC) and chest circumference (CC). In the present study an attempt was made to see whether such simpler measurements could be substituted for weight to identify neonates of low birth weight (LBW) and those at risk.

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Material and Methods

One thousand consecutive live births taking place in Chigateri General Hospital attached to J.J.M. Medical College, Davangere, were subjected for various anthropometric measurements like BW, head circumference, MAC, crown-heel length and CC within 24 hours after birth, by standard techniques(1). Statistical methods such as linear regression, correlation and χ^2 tests were used to measure the relationship between various anthrompometric values.

Results

A significant relationship between BW and other measurements was noted in the present study and MAC had better correlation with BW as compared to CC with BW (*Table I*).

Linear regression analysis was applied to predict the values of BW corresponding to MAC and CC. From the regression equation and line of regression it was shown that a cut off value for MAC of 9.1 cm and a CC of 30.5 cm corresponded to BW of 2500. Similarly, a cut-off value for MAC of 8.31 cm and a CC of 28.6 cm corresponded to BW of 2000g. The sensitivity, specificity and 95% confidence interval for BW on these cut-off values are shown in *Table II*. From the regression equation, BW = 0.6435 (MAC) – 3.3654, and BW = 0.2637 (CC) – 5.5592.

Discussion

Birth weight is a good indicator for pre-

TABLE I–*Correlation Matrix between Anthropometric Variables (n = 1000)*

	Mid arm circumference	Head circumference	Crown heel length	Chest circumference
Head circumference	0.7967			
Crown heel length	0.8692	0.7853		
Chest circumference	0.7778	0.6940	0.7090	
Birth weight	0.9329	0.8071	0.8749	0.7904

All correlations $p < 0.001$

TABLE II–*Cut-off Values of MAC and CC for predicting LBW*

BW(g)	Measurement	Cut-off value	Sensitivity	Specificity	95% confidence interval for BW
2500	MAC	9.1	92.6	94.5	2301.7 - 2781.7
	CC	30.5	78.4	82.0	1721.3 - 3341.3
2000	MAC	8.3	85.5	95.5	1551.1 - 2028.7
	CC	28.6	81.8	92.6	1586.6 - 2114.4

dicting the immediate and later outcome of a newborn. In the Third World countries more than 80% of births occur in the community and recording the weight for every birth may not be feasible(1). Therefore, a need for simple but reliable alternative method or methods has been felt. Our study shows that simple measurements like MAC and CC have high correlation with BW and support the similar observations made by earlier workers(1,2). In our study MAC had higher correlation with BW as compared to CC to BW. Vaqueres *et al.*(2) and Sharma *et al.*(3) have also shown that MAC had higher correlation with BW than CC to BW. In contrast to this observation, Bhargava *et al.* noted that CC had better correlation with BW(1). MAC is easier to record and its effective use in the community situation, by paramedical workers, has been shown by earlier workers(1). The measurement of CC requires undressing of babies and is influenced by phases of respiration, but such problem does not arise in the measurement of MAC, BW and MAC were equally useful in predicting neonatal mortality in a previously reported community study(1). Birth weight is influenced by acute problems like body water shifts where as MAC is not(4). Therefore we feel that MAC may be even more useful than the BW, in predicting the outcome of a newborn. In our study, though the head circumference had good correlation with birth weight, we feel that it may not be a useful parameter as it is influenced by

moulding and caput succedaneum.

In the present study linear regression analysis was applied to predict the values of BW corresponding to MAC and CC. From the regression equation and line of regression, a MAC of 9.1 cm corresponded to the BW of 2500 g (sensitivity 92.6% and specificity of 94.5%). This value has shown higher sensitivity and specificity in detecting infants with LBW as compared to another point at 8.7 cm of MAC as used in a study by Bhargava *et al.*(1) (sensitivity 96.2% and specificity 67.2%). Therefore, in the present study MAC value of 9.1 cm has been used as a cut-off value to detect LBW babies.

In India a birth weight of 2000 g or less has been recommended as the criteria for admitting infants into special care neonatal units.(5) In the present study 42.3% of babies were below 2500 g and 12.3% below 2000 g. A MAC of less than 8.3 cm and CC of less than 28.6 cm had good predictive value in identifying babies weighing less than 2000 g. In the present study MAC had higher correlation with birth weight as compared to CC with BW. Therefore, a cut-off value of MAC of less than 8.3 cm can be used to identify babies weighing less than 2000 g.

The present study in conjunction with other studies(1,3) shows that MAC and CC are simple, quick and reliable indicators for predicting low birth weight. It is also shown that MAC correlates better with BW than CC with BW. These measurements are easy to learn, and can conveniently be introduced into the existing system of health care in the community of developing countries for use by paramedical workers to detect neonates who are at risk.

REFERENCES

1. Bhargava SK, Ramji S, Kumar A, Man Mohan, Marwah J, Sachdev HPS. MAC and CC at birth is predictors of LBW and neonatal mortality in the community. Br Med J 1985, 291: 1617-1619.
2. Vaquera MVD, Townsend JW, Arroya J, Lechting A. The relationship between arm circumference at birth and early mortality. Trop Pediatr 1983, 29: 167-174.
3. Sharma JN, Sexena S, Sharma U. Relationship between BW and other neonatal anthropometric parameters. Indian Pediatr 1988, 25: 244-248.
4. Sasanow SR, Georgiett MK, Pereira GR. MAC and MAC/CC ratios standard curves for anthropometric assessment of neonatal nutritional status. J Pediatr 1986, 109: 311-315.
5. Singh M. Care of the Newborn, 3rd edn. New Delhi, Sagar publications, 1985, p 124.

Myositis Ossificans Progressiva

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Myositis ossificans progressiva is an extremely rare disease of children of unknown etiology characterized by progressive replacement of muscle, tendon,

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